



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER OF PATENTS AND TRADEMARKS  
Washington, D.C. 20514  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10 067,616	02 04 2002	Ruey-Jen Hwu	ISYS117272	7600

26389 7590 02 26 2003

CHRISTENSEN, O'CONNOR, JOHNSON, KINDNESS, PLLC  
1420 FIFTH AVENUE  
SUITE 2800  
SEATTLE, WA 98101-2347

EXAMINER

DONG, DALEI

ART UNIT PAPER NUMBER

2875

DATE MAILED: 02/26 2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/067,616

Applicant(s)

HWU ET AL.

Examiner

Dalei Dong

Art Unit

2875

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.

- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 04 February 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☐ Claim(s) 1-45 is/are pending in the application.
- 4a) Of the above claim(s) 42 and 43 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-41, 44 and 45 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on 04 February 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_ 6) ☐ Other: \_\_\_\_\_

Art Unit: 2875

## DETAILED ACTION

### *Election/Restrictions*

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
  - I. Claims 1-41 and 44-45 are, drawn to a device, classified in class 313, subclass 495.
  - II. Claims 42-43 are, drawn to the method of manufacturing a device, classified in class 445, subclass 24.

The inventions are distinct, each from the other because of the following reasons:

Inventions of Group I and Group II are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the product of a device can be manufacturing by a different process such as the process recited by U.S. Patent No. 6,398,608 to Cathey Jr. Invention of Group II is classified in a different class and subclass, therefore provides extra burden upon the Examiner and thus restriction is proper. The criteria for establishment of restriction is if it can be shown that the product can be made by an entirely different method as claimed by applicant. Because the method of making and the product of the spark plug are distinct invention as acquired a separate status in the art as shown by their different classification, restriction for examiner purposes as indicated is proper.

Art Unit: 2875

Because these inventions are distinct for the reasons given above and the search required for Group I is not required for Group II, restriction for examination purposes as indicated is proper.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

During a telephone conversation with Scott Y. Shigeta on February 6, 2003 a provisional election was made without traverse to prosecute the invention of a device, claims 1-41 and 44-45. Affirmation of this election must be made by applicant in replying to this Office action. Claims 42-43 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventor is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

#### ***Oath/Declaration***

2. The oath and declaration is objected to for the following reason(s):

The application is submitted by two inventors, however, the oath and the declaration shows only one inventor.

Art Unit: 2875

*Specification*

3. The disclosure is objected to because of the following informalities:

Page 24, line 23-28 should be application of an electrically insulating layer 24.

Page 26, line 4, please add respectively after the "conductive layers 207 and 208".

Appropriate correction is required.

*Claim Rejections - 35 USC § 103*

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-6, 19, 21-26, 28, 30-35, 37, 39-40 and 44-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,124,671 to Fushimi in view of U.S. Patent No. 5,847,496 to Nakamoto in further view of U.S. Patent No. 5,892,323 to Zimmerman.

Regarding to claims 1-6, 19, 21-26, 28, 30-35, 37, 39-40 and 44-45, Fushimi discloses in Figures 1 and 2, an image display device comprises "numeral 101 denotes the substrate plate; 102, the electron -emitting devices; 103, the row-direction wiring electrodes for supplying drive signals to the electron -emitting devices 102; 104, insulating members, covered with the conductive film 113a, which function as the first support members; 105 (grid), the potential-defining electrode; 113, spacers which

function as the second support members; 107, a conductive connection member for connecting the spacer with the potential-defining electrode; 108, a conductive connection member for connecting the spacer with an acceleration electrode; 109, the acceleration electrode; 110, black stripes (black conductive material); 111, the fluorescent member; 112, the face plate, and 202, electron through holes" (column 10, line 7-20).

Fushimi further discloses in Figures 1 and 2, "the conductive connection member 108 electrically connects a conductive film 113a formed on the surface of the spacer 113 with the acceleration electrodes 109 (anode), and the conductive connection member 107 electrically connects the conductive film 113a with the potential-defining electrode 105. The potential-defining electrode 105 are electrically connected with the external power source 114" (column 10, line 21-27).

However, Fushimi does not disclose a cathode having an electron emitting coating disposed thereon, wherein the cathode is suspended near the opening of the cavity on the substrate. Nakamoto teaches in Figures 1(a-h), a cathode comprised of a substrate 19, a conductive layer 17 formed on top and a core layer 16 and a electron emitting layer 16 and two insulating layers 13 and 14 and finally a gate electrode 21 formed on top of previously mentioned layers.

However, Fushimi does not teach the cathode is suspended near the opening of the cavity on the substrate. Zimmerman teaches in Figures 1 and 5, a cathode emitter suspended near the opening of the cavity.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have suspend the cathode of Nakamoto as shown by Zimmerman

Art Unit: 2875

in the image display device of Fushimi in order to improve the strength of the cathode and thus better suited to sustain stress and furthermore simply and inexpensively manufacture the device.

6. Claims 7, 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,124,671 to Fushimi in view of U.S. Patent No. 5,847,496 to Nakamoto in further view of U.S. Patent No. 5,892,323 to Zimmerman yet in further view of U.S. Patent No. 6,184,610 to Shibata.

Regarding to claims 7, 10 and 11, Fushimi discloses a image display device comprising of an anode constructed of an electrically conductive material, wherein the anode is configured to receive electrons emitted by the cathode, and wherein the anode is configured to produce an electrical current from the received electrons, wherein the anode is configured to communicate the electrical current to an external circuit, and a grid forming at least one aperture configured for allowing the passage of electrons therethrough, a seal for creating a controlled environment and finally a circuit configured for heating the cathode.

However, Fushimi does not disclose a cathode having an electron-emitting coating disposed thereon, wherein the cathode is suspended near the opening of the cavity in the substrate. Nakamoto teaches a cathode having an electron emitting coating disposed thereon.

However, fails to teach the cathode is suspended near the opening of the cavity. Zimmerman teaches a cathode being suspended over the cavity of the substrate, however,

fails to teach an electron emitting material with low work function and Aluminum and tungsten. Shibata teaches a electron-emitting material "made of any highly conducting material, preferably candidate materials include metal such as Ni, Cr, Au, Mo, W, Pt, Ti, Al, Cu, and Pd and their alloys, printable conducting materials made of a metal or a metal oxide selected from Pd, Ag, RuO<sub>2</sub>, Pd-Ag and glass, transparent conducting materials such as In<sub>2</sub>O<sub>3</sub>-SnO<sub>2</sub> and semiconductor material such as polysilicon" (column 6, line 10-16).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilize the electron-emitting layer of Shibata covering the cathode of Nakamoto and suspend the cathode as shown by Zimmerman in the image display device of Fushimi in order to facilitate electron emitted and improve the strength of the cathode and thus better suited to sustain stress and furthermore simply and furthermore inexpensively manufacture the device.

7. Claims 8-9 and 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,124,671 to Fushimi in view of U.S. Patent No. 5,847,496 to Nakamoto in further view of U.S. Patent No. 5,892,323 to Zimmerman yet in further view of U.S. Patent No. 6,091,189 to Shinjo.

Regarding to claims 8-9 and 12-13, Fushimi discloses a image display device comprising of an anode constructed of an electrically conductive material, wherein the anode is configured to receive electrons emitted by the cathode, and wherein the anode is configured to produce an electrical current from the received electrons, wherein the



anode is configured to communicate the electrical current to an external circuit, and a grid forming at least one aperture configured for allowing the passage of electrons therethrough, a seal for creating a controlled environment and finally a circuit configured for heating the cathode.

However, Fushimi does not disclose a cathode having an electron-emitting coating disposed thereon, wherein the cathode is suspended near the opening of the cavity in the substrate. Nakamoto teaches a cathode having an electron emitting coating disposed thereon.

However, fails to teach the cathode is suspended near the opening of the cavity. Zimmerman teaches a cathode being suspended over the cavity of the substrate, however, fails to teach an electron emitting material made of BaSrCa tricarbonates and Scandia and scandate. Shinjo teaches "an electron emitting substance layer that is formed by being deposited to cover surfaces of the metal layer 40 and a total of a surface of the base body 1 at the outer peripheral portion of the metal layer 40. The electron emitting substance layer 50 includes at least barium (Ba), the major component of the layer is constituted by alkaline earth metal oxides including strontium (Sr) and/or calcium (Ca) and the layer includes rare earth metal oxides of scandium oxide (Sc.sub.2 O.sub.3) etc. by 0.1 through 20% by weight" (column 14, line 34-43).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilize the electron-emitting layer of Shinjo covering the cathode of Nakamoto and suspend the cathode as shown by Zimmerman in the image display device of Fushimi in order to facilitate electron emitted and improve the strength

Art Unit: 2875

of the cathode and thus better suited to sustain stress and furthermore simply and furthermore inexpensively manufacture the device.

8. Claims 14, 20, 29, 38 and 41 rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,124,671 to Fushimi in view of U.S. Patent No. 5,847,496 to Nakamoto in further view of U.S. Patent No. 5,892,323 to Zimmerman yet in further view of U.S. Patent No. 6,051,923 to Pong.

Regarding to claims 14, Fushimi discloses a image display device comprising of an anode constructed of an electrically conductive material, wherein the anode is configured to receive electrons emitted by the cathode, and wherein the anode is configured to produce an electrical current from the received electrons, wherein the anode is configured to communicate the electrical current to an external circuit, and a grid forming at least one aperture configured for allowing the passage of electrons therethrough, a seal for creating a controlled environment and finally a circuit configured for heating the cathode.

However, Fushimi does not disclose a cathode having an electron-emitting coating disposed thereon, wherein the cathode is suspended near the opening of the cavity in the substrate. Nakamoto teaches a cathode having an electron emitting coating disposed thereon.

However, fails to teach the cathode is suspended near the opening of the cavity. Zimmerman teaches a cathode being suspended over the cavity of the substrate, however, fails to teach an electron emitting material made of cesium. Pong teaches "electron

Art Unit: 2875

emitting part 40 may be of any materials having suitable surface work function, such as refractory metals, e.g. tungsten, tungsten alloys, molybdenum or molybdenum alloys, tungsten or tungsten alloys modified with thorium, cesium, barium or lanthanum, or alloys thereof or the like" (column 3, line 20-25).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilize the electron-emitting layer of Pong covering the cathode of Nakamoto and suspend the cathode as shown by Zimmerman in the image display device of Fushimi in order to facilitate electron emitted and improve the strength of the cathode and thus better suited to sustain stress and furthermore simply and furthermore inexpensively manufacture the device.

Regarding to claims 20, 29, 38 and 41 Fushimi discloses a image display device comprising of an anode constructed of an electrically conductive material, wherein the anode is configured to receive electrons emitted by the cathode, and wherein the anode is configured to produce an electrical current from the received electrons, wherein the anode is configured to communicate the electrical current to an external circuit, and a grid forming at least one aperture configured for allowing the passage of electrons therethrough, a seal for creating a controlled environment and finally a circuit configured for heating the cathode.

However, Fushimi does not disclose a cathode having an electron-emitting coating disposed thereon, wherein the cathode is suspended near the opening of the cavity in the substrate. Nakamoto teaches a cathode having an electron emitting coating disposed thereon.

Art Unit: 2875

However, fails to teach the cathode is suspended near the opening of the cavity. Zimmerman teaches a cathode being suspended over the cavity of the substrate, however, fails to teach the controlled environment is an enclosed area filled with gas selected from the group consisting of hydrogen, helium, krypton, argon and mercury. Pong teaches, "after the sealing process is completed, the space defined by the face plate 80 and the electron emitting plate 51 is vacuumed by a vacuuming process. The resulted pressure is preferably between 1 torr to 1000 torr. Finally, the space defined by the faceplate 80 and the electron emitting plate 51 can be optionally filled with suitable Penning gas. Examples of the Penning gas are Ne--Xe, He--Xe, Ar--Xe, etc" (column 4, line 50-56).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have suspend the cathode of Nakamoto as shown by Zimmerman in the image display device of Fushimi and furthermore fill the display device with gas of Pong in order to facilitate electron movement and improve the strength of the cathode and thus better suited to sustain stress and furthermore simply and inexpensively manufacture the device.

9. Claims 15-18, 27, 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,124,671 to Fushimi in view of U.S. Patent No. 5,847,496 to Nakamoto in further view of U.S. Patent No. 5,892,323 to Zimmerman yet in further view of U.S. Patent No. 5,973,444 to Xu.

Regarding to claims 15-18, 27, 36 Fushimi discloses a image display device comprising of an anode constructed of an electrically conductive material, wherein the

anode is configured to receive electrons emitted by the cathode, and wherein the anode is configured to produce an electrical current from the received electrons, wherein the anode is configured to communicate the electrical current to an external circuit, and a grid forming at least one aperture configured for allowing the passage of electrons therethrough, a seal for creating a controlled environment and finally a circuit configured for heating the cathode.

However, Fushimi does not disclose a cathode having an electron-emitting coating disposed thereon, wherein the cathode is suspended near the opening of the cavity in the substrate. Nakamoto teaches a cathode having an electron emitting coating disposed thereon.

However, fails to teach the cathode is suspended near the opening of the cavity. Zimmerman teaches a cathode being suspended over the cavity of the substrate, however, fails to teach a grid made of material described in the limitations. Xu teaches a non-limiting example of gate electrodes, include W, Mo, Al, Cr, Pt, Au, Ag, Cu, polysilicon, silicides and mixtures thereof (column 10, line 23-25).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have suspend the cathode of Nakamoto and as shown by Zimmerman and further construct the grid using material of Xu in the image display device of Fushimi in order to better control electron emitted and improve the strength of the cathode and thus better suited to sustain stress and furthermore simply and furthermore inexpensively manufacture the device.

*Conclusion*

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The following prior art are cited to further show the state of the art of composition of a device.

U.S. Patent No. 4,897,574 to Saito.

U.S. Patent No. 5,285,131 to Muller.

U.S. Patent No. 5,614,781 to Spindt.

U.S. Patent No. 6,008,576 to Nakatani.

U.S. Patent No. 6,057,636 to Sakai.

U.S. Patent No. 6,121,725 to Grand-Clement.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dalei Dong whose telephone number is (703)308-2870. The examiner can normally be reached on 8 A.M. to 5 P.M..

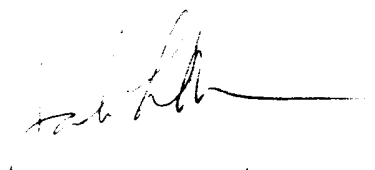
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sandra O'Shea can be reached on (703)305-4939. The fax phone numbers for the organization where this application or proceeding is assigned are (703)872-9318 for regular communications and (703)872-9319 for After Final communications.

Art Unit: 2875

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

D.D.

February 11, 2003

A handwritten signature in dark ink, appearing to be "D.D.", followed by a horizontal line extending to the right.